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Two New Dioecious Species of *Symplocos* (Symplocaceae) from
Southern Brazil

João Luiz M. Aranha Filho

Programa de Pós-Graduação em Biologia Vegetal, Departamento de Biologia Vegetal, Instituto de Biologia, Universidade Estadual de Campinas, Postal Code 6109, 13083-970 Campinas, São Paulo, Brazil. Author for correspondence: aranhafilho@gmail.com

Peter W. Fritsch and Frank Almeda

Department of Botany, California Academy of Sciences, 55 Music Concourse Drive, San Francisco, California 94118, U.S.A. pfritsch@calacademy.org; falmeda@calacademy.org

Angela B. Martins

Departamento de Biologia Vegetal, Instituto de Biologia, Universidade Estadual de Campinas, Postal Code 6109, 13083-970 Campinas, São Paulo, Brazil. amartins@unicamp.br

ABSTRACT. Two new dioecious species of *Symplocos* Jacquin from southern Brazil are described and illustrated. Both species belong to section *Barberina* (Vellozo) A. DC. of subgenus *Symplocos*. *Symplocos bidana* Aranha is characterized by its cymose or racemose inflorescences (9.5–)11–34 mm long, corolla with five or six lobes 3.7–4.9 mm long, and fruits (10–)13–20 × 5–10 mm with the calyx lobes covering the fruiting disc. *Symplocos incrassata* Aranha is characterized by its reduced cymes, bracts caducous in fruit, and fruits 12–18 × (5–)6–8 mm. In addition, both species have thick endocarps (0.8–1.2 mm), a notable character among the Brazilian species of section *Barberina*.

RESUMO. Duas novas espécies dióicas de *Symplocos* Jacquin do sul do Brasil são descritas e ilustradas, do subgênero *Symplocos*, seção *Barberina* (Vellozo) A. DC. *Symplocos bidana* Aranha é reconhecida por sua inflorescência cimosa ou racemosa (9.5–)11–34 mm compr., corola com 5 a 6 lobos com 3.7–4.9 mm compr., e frutos (10–)13–20 × 5–10 mm com lobos do cálice cobrindo o disco no fruto. *Symplocos incrassata*
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Aranha é reconhecida por suas cimeiras reduzidas (4–7 mm compr.), brácteas caducas no fruto, e fruto 12–18 × (5–)6–8 mm. Além disso, as novas espécies são distintas pela espessura de seus endocarpos, 0.8–1.2 mm, raro entre as espécies brasileiras de *Barberina*.

Key words: IUCN Red List, sect. *Barberina*, southern Brazil, Symplocaceae, *Symplocos*.

Symplocos Jacquin, one of two genera of the monophyletic family Symplocaceae (Fritsch et al., 2008), comprises ca. 318 species distributed mainly in tropical and subtropical regions of America, southern and eastern Asia, Australia, and the East Indies. Several species occur in the temperate zones of eastern Asia and the southeastern United States (Occhioni, 1974; Wang et al., 2004; Fritsch et al., 2006, 2008).

The two species here described both belong to *Symplocos* subg. *Symplocos* sect. *Barberina* (Vellozo) A. DC. (sensu Fritsch et al., 2008), a monophyletic group with ca. 26 species (including those described here) in the Americas and one species in eastern Asia

(Fritsch et al., 2008). The section is characterized by a basally connate corolla, stamens that are adnate to the corolla only at the base and either completely distinct or united only at the base, terete filaments, a 3-carpellate ovary, hermaphroditic or with a dioecious breeding system (morphologically androdioecious through similar appearance of staminodes to stamens in flowers of female plants), a 1-locular fruit with one seed, rarely 2- or 3-locular with two or three seeds, and an embryo with the radicle longer than the cotyledons, rarely shorter than the cotyledons (Brand, 1901; Fritsch et al., 2008).

Although staminate and pistillate flowers are morphologically distinct, they share several characteristics. To avoid repetition in the descriptions, we first describe the flowers generally, stating the shared features, and then describe the features specific to staminate and pistillate flowers separately in turn.

1. *Symplocos bidana* Aranha, sp. nov. TYPE: Brazil. Paraná: Mun. Quatro Barras, Morro Mãe Catira, 17 Aug. 1989, R. Kummrow & O. S. Ribas 3170 (holotype, MBM; isotypes, NY not seen, SPF). Figure 1.

Haec species quoad habitum, foliorum formam magnitudinem indumentumque ac fructum satis grandem *Symplocoti variabili* Martius ex Miquel ut videtur arcte affinis, sed ab ea lobulis corollinis majoribus 5 vel 6 in sicco parce atropunctatis, lobulis calycinis in fructu discum obtegentibus atque endocarpio crasso distinguitur.

Evergreen dioecious shrub or tree, 1.5–10 m tall; branchlets strongly angled, ridged, striate, transversely and longitudinally strongly fissured, glabrous; vegetative buds glabrous. Leaves simple, alternate, petiolate, stipules lacking; petioles (8–)10–35 mm, adaxially rounded or rarely concave, abaxially convex, glabrous; leaf blades elliptic to broadly elliptic, occasionally ovate or rarely oblanceolate, 3.5–13 × 1.2–5.5 cm, coriaceous, dark green adaxially, green abaxially, glabrous, venation ± brochidromous, midvein impressed or slightly elevated on both surfaces, base attenuate, margin conspicuously serrate to inconspicuously serrulate with (1 to 8)9 to 14 teeth, rarely entire, revolute, marginal glands often caducous, apex acute, acuminate to obtuse with acumen, rarely obtuse or retuse, acumen (when present) 3–14 mm, apical gland caducous or less often persistent. Inflorescences axillary, cymose or racemose, (9.5–)11–34 mm, 3- to 16-flowered, glabrous, peduncle 5–30 mm; bracts early caducous, numerous, strongly imbricate and forming a closed and conical structure 7–12 mm, 4–6 × 4–5 mm, glabrous, margin ciliate to ciliolate, apical gland usually absent. Flowers 4.7–6.5(–7) mm, hypanthium glabrous. Pedicel 0.5–3 mm, articulated; bracteoles early cadu-

cous, 1 or 3 per flower, obovate or ovate, flat to vaguely concave, 2.5–3 × 1.5–2 mm, glabrous, margin ciliolate, apex obtuse-rounded, apical gland lacking. Calyx lobes 5, oblong to obovate, erect, 1–1.7 × 1.5–2 mm, glabrous, margin ciliate or occasionally ciliolate. Corolla tube 0.5–0.6 mm, lobes 5 or 6, erect, white, ± oblong, concave, 3.7–4.9 × 3.5–5.5 mm, glabrous, densely papillose mainly near the margin, dark dots sparsely distributed mainly on the proximal half of the adaxial surface (in dried specimens), margin ciliate to ciliolate. Stamens and staminodes adnate to the corolla mostly in clusters alternate with the lobes; filaments erect, the longer series exceeding the style and stigma (when the latter are present in staminate flowers), glabrous. Disc flat, 5-lobed, smooth, glabrous. Staminate flowers: hypanthium (0.5–)1.3–1.5 mm; stamens in 3 to 6 series of different lengths, (25 to 34)35 to 50(51 to 60), 25 to 50 stamens alternate with the corolla lobes, 0 to 10 stamens opposite the corolla lobes, 1.5–6 mm; filaments completely distinct or connate portion up to 0.4 mm; ovary aseptate or with 1 to 3 incomplete septa; style usually present or rarely lacking, straight to curved, occasionally bifurcate, to 3 mm, glabrous; stigma obsolete; disc 0.6–0.8 mm diam. Pistillate flowers: hypanthium 2–2.2(–2.5) mm; staminodes in 2 to 4 series of different lengths, 13 to 18, 13 to 15 alternate with the corolla lobes, 0 to 3 opposite the corolla lobes, 1.5–3 mm; filaments completely distinct or connate portion up to 0.5 mm; style straight, 1.7–2.3 mm, glabrous; stigma capitate or 3-lobed; disc 0.7–1.1 mm diam. Drupe ellipsoid or occasionally ovoid, (10–)13–20 × 5–10 mm, glabrous; calyx lobes lying above or occasionally tightly appressed to disc; disc not visible; endocarp 0.8–1.1 mm thick; seed ellipsoid, 6–13 mm, circular in cross section, rugose, in dried specimens flattened and crescent-shaped.

Distribution and habitat. *Symplocos bidana* is known from northeastern Paraná State to northeastern Santa Catarina State, growing in Mata Atlântica rainforest of the Serra do Mar. This species dwells in elfin forest (to ca. 2000 m elevation), occurring also on the lower slopes (ca. 900 m elevation) in ombrophilous forest.

IUCN Red List category. *Symplocos bidana* occurs mostly in protected areas in Paraná (e.g., Parque Estadual Pico Paraná and Parque Estadual Pico Marumbi), but in Santa Catarina it occurs outside protected areas. Our field observations suggest that this species is uncommon, but there are no data regarding estimates of population numbers or sizes. Therefore, we recommend a conservation status of Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

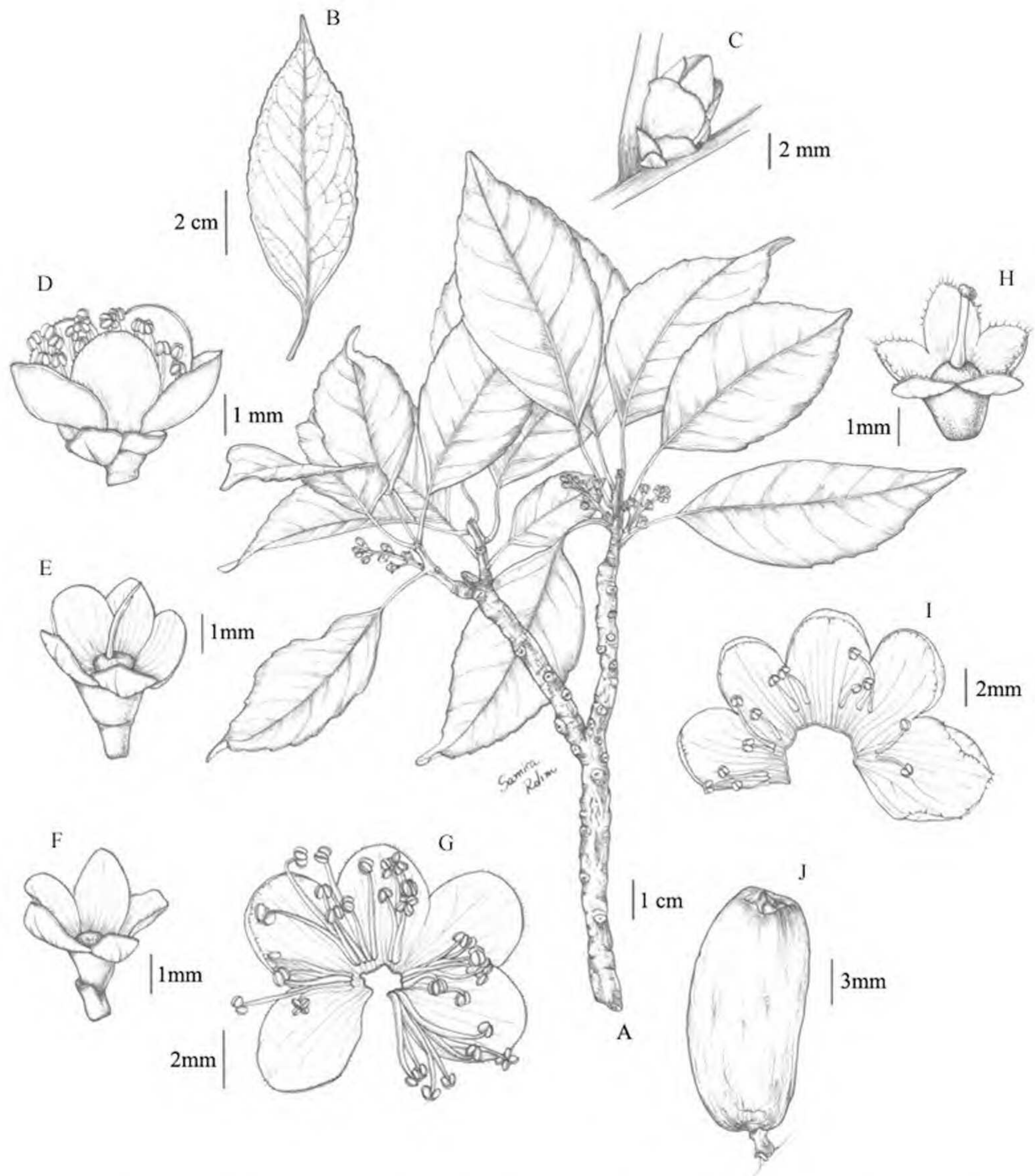


Figure 1. *Symplocos bidana* Aranha. —A. Flowering branch. —B. Representative leaf (abaxial surface). —C. Bracts. —D. Staminate flower at anthesis. —E. Staminate flower with corolla and androecium removed to show ovary apex and nonfunctional style. —F. Staminate flower with corolla and androecium removed to show ovary apex and the absence of style and stigma. —G. Staminate flower corolla opened outward to show epipetalous stamens. —H. Pistillate flower with corolla and androecium removed to show ovary apex, style, and stigma. —I. Pistillate corolla opened outward to show epipetalous staminodes. —J. Mature fruit. (A–F, drawn from the holotype *Kummrow & Ribas 3170*, MBM; G, *Dala Rosa 3*, UPCB; H, I, *Soares & Maschio 148*, MBM; J, *Stange 79*, UPCB.)

Phenology. Flowering in May to October; fruiting in September to December.

Etymology. The specific epithet honors Adriano Bidá, who has provided important contributions to the knowledge of Brazilian Symplocaceae. Dr. Bidá dedicated his professional life to teaching and research at the Universidade Federal

do Paraná. He is now retired and currently lives in Curitiba.

Discussion. *Symplocos bidana* is characterized by its large inflorescences (9.5–)11–34 mm long, corolla with five to six lobes, lobes 3.7–4.9 mm long with sparse black dots mainly on the proximal half of the adaxial surface (in dried specimens), large fruit ([10–]

13–20 × 5–10 mm), calyx lobes covering the disc in fruit, and thick endocarp (0.8–1.1 mm).

Based on its habit, leaf shape, size, and indument, and relatively large fruit, the latter feature uncommon among Brazilian species of *Symplocos* sect. *Barberina*, we hypothesize that *S. bidana* is closely related to *S. variabilis* Martius ex Miquel. *Symplocos variabilis* can be distinguished from *S. bidana* by its three or four corolla lobes that are smaller (2.5–3 mm long) and without black dots in dried specimens, calyx lobes that do not cover the disc in fruit, and endocarp less than 0.5 mm thick.

Paratypes. BRAZIL. **Paraná:** Morretes, *S. Dala Rosa* 3 (UPCB); Quatro Barras, Morro Mãe Catira, *R. Kummrow & J. Cordeiro* 3040 (G, MBM); Morretes, Serra da Igreja, *A. Y. Mochinski & M. B. Scheer* 231 (MBM, UPCB); Campina Grande do Sul, Serra do Ibitiraquire, *O. S. Ribas, J. M. Silva & E. Barbosa* 1495 (HB [2], MBM, SJRP, UPCB), *O. S. Ribas, J. M. Silva & E. Barbosa* 1520 (G, HB, K, MBM, NY, RB, UPCB); Morretes, Parque Estadual Marumbi, *A. Soares & W. Maschio* 148 (MBM); along a trail on W slope of Morro do Canal, *P. W. Fritsch, J. L. M. Aranha Filho & E. Barbosa* 1806 (CAS, UEC); Piraquara, Morro do Canal, *E. J. Stange* 79 (UPCB). **Santa Catarina:** Botuverá, Morro do Barão, *R. Reitz & R. M. Klein* 17990 (UPCB).

2. *Symplocos incrassata* Aranha, sp. nov. TYPE: Brazil. Paraná: Pico Caratua, Mun. Campina Grande do Sul, 2 Aug. 1967, *G. Hatschbach* 16821 (holotype, MBM; isotypes, HB, K [2] not seen, MBM, NY [3] not seen). Figure 2.

Haec species quoad cymam deminutam *Symplocoti itatiaiae* Wawra simillimis, sed ab ea bracteis in fructu caducis, fructu majore atque endocarpio crasso distinguitur.

Evergreen dioecious shrub, occasionally a small tree, 0.7–3 m tall; densely branched, branchlets angled, ridged, striate, transversely and longitudinally fissured, glabrous; vegetative buds glabrous. Leaves simple, alternate, petiolate, stipules lacking; petioles 2.5–10 mm, adaxially slightly to moderately concave, abaxially rounded to occasionally convex, glabrous; leaf blades elliptic to obovate, 1.5–4.5 × 0.6–1.6 cm, coriaceous, dark green adaxially, green abaxially, both surfaces sparsely to densely puberulent or glabrous, venation ± brochidodromous, midvein impressed to somewhat elevated on both surfaces, base cuneate to attenuate, margin entire or inconspicuously serrulate with 1 to 5 teeth, revolute, marginal glands often caducous, apex usually hooked, acuminate or occasionally acute, rarely obtuse or retuse, acumen (when present) 1–3 mm, apical gland caducous or less often persistent. Inflorescences axillary, cymose, 4–7 mm, 1- to 3-flowered, rarely 4- or 5-flowered, glabrous, peduncle 1–2 mm (1–3[–4] mm when 1-flowered); bracts persistent at anthesis and caducous in fruit, numer-

ous, imbricate, spreading outward and forming a cylindrical and open or less often globose structure 2.5–3 mm, 0.9–1.5 × 1–2.2 mm, glabrous, margin ciliate to ciliolate, apical gland lacking. Flowers 3.5–4.3(–5) mm, hypanthium glabrous. Pedicel nearly absent to 1 mm, articulated; bracteoles early caducous, 1 or 2 per flower, deltoid or occasionally ovate, concave, 0.8–1.2 × 0.8–1.2 mm, glabrous, margin ciliolate, keeled, apex acute or occasionally obtuse, apical gland lacking. Calyx lobes 5, oblong to nearly deltoid, erect, 1.3–1.6 × 0.8–1.2 mm, glabrous, margin ciliate or occasionally ciliolate. Corolla tube 0.4–0.6 mm, lobes 5, erect, white, ± oblong, concave, 2.5–3.4 × 1–3.8 mm, glabrous, obscurely and sparsely papillose mainly near the margin, margin entire or occasionally sparsely ciliolate. Stamens and staminodes adnate to the corolla mostly in clusters alternate with the lobes; filaments erect, the longer series exceeding the style and stigma (when the latter are present in staminate flowers), glabrous. Disc flat, obscurely 5-lobed, smooth, glabrous. Staminate flowers: hypanthium 0.6–1 mm; stamens in 3 to 6 series of different lengths, (24 to 26)27 to 35, 24 to 28 alternate with the corolla lobes, 0 to 7 opposite the corolla lobes, 0.8–4.5 mm; filaments completely distinct or connate portion up to 0.5 mm; ovary aseptate or with 1 to 3 incomplete septa; style usually lacking, when present straight or curved, sometimes bifurcate, to 2 mm, glabrous; stigma obsolete; disc 0.6–1 mm diam. Pistillate flowers not seen. Drupe ellipsoid, 12–18 × (5–)6–8 mm, glabrous; calyx lobes erect, rarely incurved but not tightly appressed to disc; disc usually visible; endocarp 0.9–1.2 mm thick; seed ellipsoid, 8–10 mm, circular in cross section, rugose, in dried specimens flattened and crescent-shaped.

Distribution and habitat. *Symplocos incrassata* has been collected only near Curitiba in the eastern region of Paraná State. This species grows in the Serra do Mar, dwelling mainly in elfin forest (ca. 2000 m elevation) and rarely in ombrophilous forest at 1500 m elevation.

IUCN Red List category. *Symplocos incrassata* is poorly sampled in herbaria and our field observations suggest that this species is rare, but there are no detailed data regarding estimates of population numbers or sizes. Fortunately, the new species is protected within Parque Estadual Pico Paraná. The extent of occurrence is less than 5000 km² and there are fewer than five localities known. Therefore, we recommend a conservation status of Endangered (EN B1a) according to IUCN Red List criteria (IUCN, 2001).

Phenology. Flowering in July to September; fruiting in October to November.

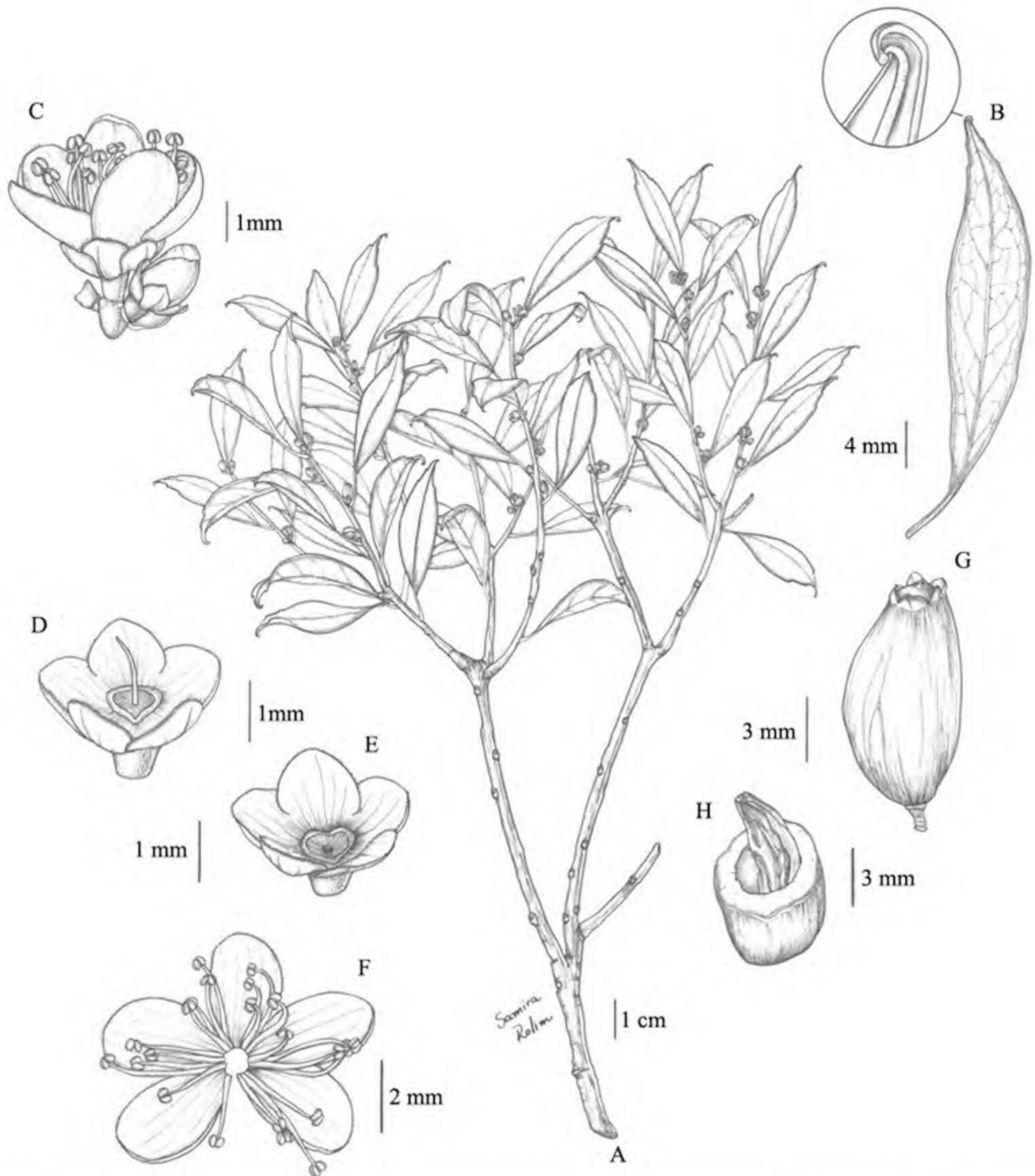


Figure 2. *Symplocos incrassata* Aranha. —A. Flowering branch. —B. Representative leaf (abaxial surface) and apex enlargement. —C. Staminate flower at anthesis, flower bud, and subtending bracteole. —D. Staminate flower with corolla and androecium removed to show ovary apex and nonfunctional style. —E. Staminate flower with corolla and androecium removed to show ovary apex and the absence of style and stigma. —F. Staminate corolla opened outward to show epipetalous stamens. —G. Mature fruit. —H. Mature fruit in cross section with dried seed. (A–F, drawn from the holotype *Hatschbach 16821*, MBM; G, H, *Ribas & Dittrich 2188*, MBM.)

Etymology. The specific epithet is from the Latin for “thickened,” in reference to its relatively thick endocarp, rare among section *Barberina* species.

Discussion. Although pistillate flowers are unknown in *Symplocos incrassata*, this species must nonetheless be functionally dioecious, like the majority of probably all Brazilian section *Barberina* species (Aranha Filho et al., 2009). The staminate flowers often lack a style, and when the style is present the stigma is obsolete. Moreover, staminate

flowers almost always lack ovules, and when they are present they are reduced and in all likelihood nonfunctional because in male plants only old flowers have been observed, without any apparent development of young fruit.

Symplocos incrassata is characterized by its small cymes 4–7 mm long, bracts caducous in fruit, large fruits (12–18 × [5–]6–8 mm), and thick endocarp (0.9–1.2 mm). Among the species of *Symplocos* sect. *Barberina*, only *S. itatiaiae* Wawra has the type of

diminutive cyme observed in *S. incrassata*. *Symplocos itatiaiae* can be distinguished from *S. incrassata* by its persistent bracts in fruit, smaller fruits (6–7 × 3–4 mm), and an endocarp less than 0.2 mm thick.

Paratypes. BRAZIL. **Paraná:** Campina Grande do Sul, Serra do Ibitiraquire, O. S. Ribas, J. M. Silva & E. Barbosa 1500 (G, HB [3], K, MBM, NY, SPF, UPCB); trail to Pico Caratuva, P. W. Fritsch, J. L. M. Aranha Filho & E. Barbosa 1828 (CAS, UEC); Antonina, Serra do Ibitiraquire, O. S. Ribas & V. A. O. Dittrich 2188 (B, HRCB, MBM, SPF).

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